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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/406,663	09/27/1999	DANIEL R. KNEBEL	13031(YO999-	1830

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EXAMINER

FERRIS III, FRED O

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 08/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/406,663

Applicant(s)

KNEBEL ET AL.

Examiner

Fred Ferris

Art Unit

2128

*S*

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-41, and 43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 39-41 and 43 is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 September 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other:

### DETAILED ACTION

1. This office action is in response to applicant's amendment filed on 26 May 2004. Claims 1-41, and 43 are currently pending in this application. Claims 39-41, and 43 were previously allowed. Claims 1-38 remain rejected. Applicants have canceled claim 42.

### Response to Arguments

2. Applicant's arguments filed on 26 May 2004 have been fully considered.

Regarding applicant's response to 102(b) rejections (Dangelo/Rowson): The examiner withdraws the 102(b) rejections (Dangelo and Rowson) in view of applicant's amendment to the claims.

Regarding applicant's response to 103(a) rejections (Dangelo in view of Kash): The examiner first asserts that the amendment to independent claims 1, 36, and 37 relating to "visualizing the device activity representation as a simulation of optical emissions that occur as a result of the device activity" and representing the expressed activity in a "visual form that illustrates causal relationships" does not overcome the 103(a) prior art rejections. For example, the "causal relationship" as shown in Figure 1 of claimed invention merely depicts waveforms with noted transitions between the rising and falling edges (relative to time and amplitude) as would be shown on any multi-channel digital oscilloscope or CAD circuit simulator commonly used in the art for timing analysis. This relationship is clearly implied in Figure 19 of Dangelo. Namely, that the "cause" of an event or state change for each device is "related" to the state (activity)

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*of the other devices in the circuit. Second, the limitations of independent claims 1, 36 and 37 relating to "visualizing the device activity" in a defined form do not alone distinguish the claimed invention over the prior art since both Dangelo (Fig. 19), and Kash (CL15-L4, CL7-L1-10), include features for displaying device activity (visualizing results) in a meaningful (defined form) way to the user. Therefore, the examiner asserts that the claimed features (including new limitations) are obvious in view of the elements already disclosed in the prior art. (Also see 103(a) rejection below) Accordingly, the examiner has maintained the 103(a) rejection of claims 1-38. For these reasons, the examiner has encouraged applicants to amend independent claims 1, 36, and 37 as noted below under Allowable Subject Matter.*

### ***Drawings***

3. *This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.*

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**4. Claims 1-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,555,201 issued to Dangelo et al in view of U.S. Patent 6,327,394 issued to Kash et al.**

Per claim 1: Dangelo discloses **visualizing the operation of a circuit** by obtaining **device activity** from **measured or simulated** activity and **visually displaying results** representing the device activity. (Abstract, Summary, CL22-L55, CL24-L58, CL28-L28, CL32-L62, Figs. 8, 9, 13-15, 18-20, 25) Per claims 2-38: Dangelo also discloses sequence relationships (Figs. 13-15), IC CAD viewer (Figs. 18, 19), sequence graph (Figs. 13-15), simulated activity (events/states) (Figs. 8, 9, 13-15, 18-20, 25), switching events (Figs. 18, 19), switching behavior from netlist (Figs. 2, 8, 9), waveform transitions (Figs. 18, 19), and test vector sequencing and analysis (comparison) (CL24-L65).

Dangelo does not explicitly teach modeling device emissions of designated areas (regions) as point sources or optical emission measurement data comparison.

Kash discloses techniques for processing optical emission data ("waveforms") for the derivation of quantitative data on circuit delays from time resolved images of

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*switching induced emission in CMOS circuits. Kash further discloses the analysis of delays associated with gate to gate propagation, designated point source areas, and the (x, y) pixels in generating waveforms in emission measurement and comparison. (entire teaching, especially: Abstract, Summary, CL9-L19-61, CL10-L45-CL12-L47, CL13-L45, CL14-L25, Figs. 1-7)*

*It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the teachings of Dangelo relating to **visualizing the operation of a circuit** by obtaining **device activity** from **measured or simulated** activity and **visually displaying results** representing the device activity, with the teachings of Kash relating to techniques for processing optical emission data ("waveforms"), to realize the claimed invention. It would further have been obvious to include features such as slow motion animation, animated schematics, highlighted color features, and audio tones since these features were available (inherent) in nearly all of the popular CAD circuit design programs (AutoCAD, Spice, etc.) at the time of the invention. An obvious motivation exists since this area of technology is highly competitive with long felt need already established in the market place (See Kash CL7-L25) and large amounts of money being spent in product development and improvement. (See, Knebal conclusion, for example) Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place and, hence, would have been motivated to modify the teachings of Dangelo with the teachings of Kash in order to reduce development time and cost.*

**Allowable Subject Matter**

5. The following is an examiner's statement of reasons for allowance:

Independent claim 39 uses "mean for" language is are given deference in view of *In re Donaldson* and interpreted in view of 35 U.S.C. § 112 paragraph 6. The "means for" language and the limitations related thereto of claim 39 is interpreted within the scope of enablement as provided within the relative embodiment provided within applicant's specification. Specifically, applicant's specification page 6, line 15 to page 9 line 11, page 13, line 30 to page 14, line 25, page 15, line 19 to page 20, line 5, and Figs. 3-9 disclose the claimed inventions "means for" expressing and visualizing the simulated circuit optical emission activity.

Applicants are encouraged to amend independent claims 1, 36 and 37 to include "means for" or "step for" language in each limitation (i.e. "means for" or "step for" **visualizing device activity**, "means for" or "step for" **instruction trace** to obtain a first representation, etc., for example). In doing so, the examiner could then interpret applicant's limitations relating to visualizing the device activity in a defined form, causal relationships, etc., in light of the specific embodiment provided in applicant's specification in distinguishing the claimed invention over the prior art as noted above. (See: MPEP 2181) At such time the examiner would favorable consider entry of an after final amendment and the allowance of the independent claims and related dependent claims.



**Conclusion**

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, careful consideration should be given prior to applicant's response to this Office Action.

U.S. Patent 6,483,327 issued to Bruce et al teaches time-resolved detection of photoemissions in integrated circuit testing.

U.S. Patent 5,528,156 issued to Ueda et al teaches IC analysis by photoemission detection.

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*"Failure Analysis of ULSI circuits Using Photon Emission", Y. Uraoka, IEEE Log Number 9211664, IEEE 1993 – teaches IC analysis by photoemission detection.*

*"The Attack of the "Holey Shmoos": A Case Study of Advanced DFD and Picosecond Imaging Circuit Analysis (PICA)", W. Huott, ITC International Test Conference, IEEE, January 1999 – teaches IC analysis by PICA.*

*Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 703-305-9670 and whose normal working hours are 8:30am to 5:00pm Monday to Friday.*

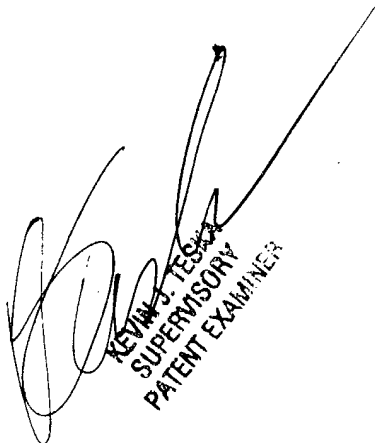
*Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 703-305-3900.*

The Official Fax Numbers are:

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August 4, 2004



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